REMARKS

Claims 1, 2, 4, 5, 8, 11, 12, 14, and 15 have been amended to clarify the invention. Support for the amendment to Claim 1 can be found at page 16, lines 3-5, in Figures 8 and 14, for example. Support for the amendment to Claim 8 can be found at page 13, line 8 to page 14, line 22, for example. Support for the amendment to Claim 11 can be found in Figures 2, and 4-7, for example. Support for the amendment to Claim 12 can be found in Figures 1b and 1c, for example. Support for the amendment to Claims 14 and 15 can be found in Figures 2, 4, 5, and 10, for example. Clarifying amendment has been made to Claims 2, 4, and 5.

Claim 13 has been canceled without prejudice.

Claims 26 and 27 have been added. Support for Claim 26 can be found at page 16, lines 3-5, for example. Support for Claim 27 can be found in the first complete paragraph on page 11, for example.

The specification has been amended to correct the informalities set forth in the Office Action. The drawings have been amended as requested above.

The amendments do not constitute the addition of any new matter to the specification. Applicant respectfully requests entry of the amendments and reconsideration of the application in view of the amendments and the following remarks.

Drawings

The drawings have been objected to under 37 CFR1.83(a) because of i, ii, iii, and iv below.

i. The Examiner asserts that Figures 5 and 6 fail to show the relationship between the fuzzy control module and the autonomous evolutionary process unit as described in the specification on page 11, lines 3-6.

However, Figure 5 is a drawing for explaining an acceleration optimization control unit 408 (previously 504) (page 10, lines 8-17), whereas Figure 4 is a drawing for explaining a constant speed navigation control unit 403 (page 9, line 28-page 10, line 7). As explained in the section "Control in Acceleration Optimization Control Section" on page 14, line 23 through page 17, line 19, the acceleration optimization control unit does not include the fuzzy control module (Figure 14). For the Examiner's reference, the description from page 10, line 20 through page 17, line 19 can be summarized as follows:

- Constant speed navigation control unit ⇐ Figures 4 and 8 (fuzzy control is used)
- Acceleration optimization control unit ⇐ Figures 5 and 14 (no fuzzy control is used)

Figure 6 shows a boat operation fuzzy control module 407 (previously 60) which is included in the constant speed navigation control unit 403 in Figure 4 (page 10, line 27-page 11, line 14). Thus, contrary to the Examiner's assertion, Figure 5 should not show the fuzzy control module.

ii. The Examiner asserts that Figure 5 fails to show a throttle control element. However, as explained above, Figure 5 is a drawing for explaining the acceleration optimization control unit 408 which does not control the electronic throttle, whereas the constant speed navigation control unit 403 indicated in Figure 4 controls the electronic throttle. Thus, Figure 5 need not show a throttle control element.

iii. The Examiner asserts that the figures fail to clearly show the relationship between the total table and the fuzzy table. However, as explained above, Figure 5 is not a drawing for explaining the fuzzy control. Figure 6 shows the boat operation fuzzy control module 407 wherein inputs from the interactive evolutionary process unit 404 and the autonomous evolutionary process unit 405 are omitted simply to show the input-output relationship. The functions of the boat operation fuzzy control module, the interactive evolutionary process unit, and the autonomous evolutionary process unit are explained in Figure 8, and the total table is explained in Figure 11. Thus, Figures 5 and 6 need not show the relationship between the total table and the fuzzy table.

iv. The Examiner asserts that Figures 8 and 10 do not show a method for switching between autonomous evolution and interactive evolution. Figures 8 and 10 have been corrected in light of the Examiner's assertion.

In conclusion, it is respectfully submitted that this objection should be withdrawn.

Objections to Specification

The abstract has been objected to because it does not fully describe applicant's claimed invention. The Examiner asserts that applicant's claimed invention pertains to a control system which includes genetic algorithms and fuzzy inference. However, in the claimed invention, genetic algorithms and fuzzy inference are not indispensable. A certain control system such as the acceleration optimization control unit shown in Figures 5 and 14 does not have an evolution

process involving fuzzy inference, which is encompassed in the claimed invention. Nonetheless, per the Examiner's suggestion, the abstract has been amended to include the feature using genetic algorithms and fuzzy inference.

Further, the Examiner asserts that the title of the invention is not descriptive and suggests "A Control System for Optimizing the Function of a Machine Assembly using GA-Fuzzy Theory." However, as explained above, "GA-Fuzzy Theory" is not indispensable in the claimed invention. Nonetheless, the title of the invention has been amended in accordance with the Examiner's suggestion, because it may represent one of the features of the claimed invention.

The disclosure has been objected to because of i-ix described below.

i. The Examiner asserts that the description of the interactive autonomous evaluation method is not located in the proper place or is not complete, and that the relevant description should be continued from page 12, section (a), as section (b). However, the evolutionary process in an autonomous evolutionary process unit is explained in section (a) on pages 12-13, and the evolutionary process in an interactive evolutionary process unit is explained in section (b) on pages 13-14. Applicant believes that the description is sufficient for one of ordinary skill in the art to practice the invention.

ii. The Examiner asserts that page 13 line 2 incorrectly refers to step 1-2 of figure 8 and that it should refer to step 1-5. However, neither is step 1-2, step 1-5 is not correct because the evaluation value calculation process is not step 1-5 (step 1-5 is an evolutionary process) but is described in the previous paragraphs (i.e., multiple individuals are operated in parallel and compared after multiple cycles, and when detecting pitching and Dutch roll, zero is given as an individual evaluation). Accordingly, the specification has been amended to delete "step 1-2".

iii. The Examiner asserts that the specification does not refer to the acceleration optimization control line shown in figure 12. The specification has been amended to refer to the line on page 15, line 27.

In conclusion, it is respectfully submitted that the above objections should be withdrawn.

Rejection of Specification

The specification has been rejected under 35 U.S.C. 112, first paragraph which requires the specification to be written in "full, clear, concise, and exact terms." The Examiner shows iv, v, vi, vii, viii, and ix as examples:

iv. The Examiner asserts that page 6 line 6 should read "in parallel" rather than "in a line." The specification has been so amended.

v. The Examiner asserts that on page 11 lines 23-24, "interactive optimum process" is not defined but understood as "interactive evaluation process." However, the term means "interactive evolutionary process" as the paragraph (lines 18-26 of page 11) describes the interactive evolutionary process. The term has been so amended. Additionally, the term "autonomous evolutionary process" in line 20 of page 11 is an error and should have been "interactive evolutionary process" as amended herein.

vi. The Examiner asserts that lines 9-10 of page 14 contradict with lines 31-32 of page 13. However, as is clear from Figure 8 (step 2-8), if a desired boat operation character is obtained, the interactive evolutionary process is terminated, whereas if a desired boat operation character is not obtained, the interactive evolutionary process is not terminated but repeated until stipulated generations are reached. The specification has been amended for clarification.

vii. The Examiner asserts that lines 24-26 of page 20 do not show any distinction between the autonomous evaluation and the interactive evaluation. The Examiner's assertion is not clear to Applicant. Figure 1e shows three ways to modify the matrix of fuzzy rules: (i) changing the membership functions, (ii) changing the fuzzy rules, and (iii) changing the input-output level (standardized coefficients) of the matrix (page 6). These are all parameters to regulate the matrix of fuzzy rules. The fuzzy rules can be expressed by numerals (e.g., Figure 7) and treated as parameters, as with the membership functions and the input-output level. In the above, (i) and (ii) may be suitably conducted by autonomous evaluation, whereas (iii) may be suitably conducted by interactive evaluation because it is preferable and easy for a user to evaluate the overall performance of the machine by judging the output of the control module (interactive evaluation). (i) and (ii) may require more complicated processing, and thus, it is more suitable to proceed autonomously, based on preselected target values. That is an embodiment explained in lines 24-26 of page 20. Applicant does not clearly understand the Examiner's assertion and believes that the sentence is not unclear.

viii. The Examiner asserts that the "total table" of page 14, line 12 is not clearly defined. However, the total table is the one used in step 2-3 explained on page 13, lines 15-22. In order to clarify the above, the specification has been amended.

ix. The Examiner asserts that lines 26-33 of page 12 requires that pitch and Dutch roll be detected by the control system, but no sensors are disclosed. The specification has been amended to clarify that pitch and Dutch roll are detected by sensors. Any conventional sensors such as tiltmeter, gyroscope, accelerometer, etc. can be used.

In conclusion, it is respectfully submitted that the rejections should be withdrawn.

Claim Rejection Under 35 U.S.C. § 112, first paragraph

Claim 8

Claim 8 has been rejected under 35 U.S.C. § 112, first paragraph, with regard to the phrase "monitoring the fuzzy rule matrix in use". Claim 8 has been amended to delete the phrase and further clarify the invention.

Claim 13

Claim 13 has been canceled without prejudice.

Claims 1-25

Claims 1-25 has been rejected under 35 U.S.C. § 112, first paragraph, with regard to the term "in real time" in Claims 1 and 11. The Examiner correctly reads it to mean occurring during operation of the device. Claims 1 and 11 have been amended accordingly.

In conclusion, it is respectfully submitted that the rejection should be withdrawn.

Claim Rejection Under 35 U.S.C. § 112, second paragraph

Claims 14-17

Claims 14-17 have been rejected under 35 U.S.C. § 112, second paragraph, with regard to the phrase "carries out optimization" in Claims 14 and 15. Claim 14 has been amended to clarify the autonomous evaluation unit (e.g., Figure 4 (406) and Figure 5 (507)). Claim 15 has also been amended to clarify the evaluation input unit (e.g., Figure 10).

The limitations "the optimization process" and "the results" have been found to have insufficient antecedent bases. The limitations have been deleted.

In conclusion, it is respectfully submitted that this rejection should be withdrawn.

Rejection of Claims 1-3 and 5 Under 35 U.S.C. § 102

Claims 1-3 and 5 have been rejected under 35 U.S.C. § 102(b) as being anticipated by Jeong (US 5,673,565).

Claim 1

Claim 1 has been amended to recite that the control module is optimized based on a combination of the user's ultimate choice during the operation and a preselected target used separately. By using both the user's real-time criteria (interactive evaluation) and the preselected criteria (autonomous evaluation) by switching, to optimize the same control module, the control module can be optimized and adapted to the user very effectively.

In contrast, Jeong does not teach or even suggest the combination of interactive evaluation and autonomous evaluation (see Figure 5). Thus, Claim 1 could not be anticipated by Jeong.

Claim 2

Claim 2 has been amended to clarify that the auxiliary control module is for adjusting output of the main control module, and the optimization process is conducted on the auxiliary control module (e.g., Figures 1b and 1c). Accordingly, the optimization process can be applied to the main control module as an addition to the machine.

In contrast, Jeong does not teach or even suggest the above feature. Figure 3 of Jeong shows that the inference device outputs signals to the control device. No auxiliary control module is indicated. The Examiner may think that the calculation device is an auxiliary control module. However, the calculation device is disposed upstream of the inference device, and thus, it is impossible to apply optimization processing by the inference device to the calculation device. Because there is nothing disposed between the inference device and the control device in Figure 3 of Jeong, Claim 2 could not be anticipated by Jeong.

Claim 3

As explained above, Jeong does not disclose an auxiliary control module. Claim 3 further recites the series arrangement. Jeong in no way anticipates Claim 3.

Claim 5

Claim 5 has been amended to clarify that the local control receives signals from the central control module and outputs signals to the respective replaceable devices, and that the optimization process is conducted on the central control module (e.g., Figure 1d). In Jeong, in Figure 3, the inference device (Figure 5) outputs signal of the optimum defrosting period to the control device. No local control module is indicated downstream of the control device in Figure 3. Since the optimum defrosting period is inputted into the control device, no local control module would be required in Jeong. Claim 5 could not be anticipated by Jeong.

In conclusion, as explained above, Claim 1 could not be anticipated by Jeong, and for the reason, dependent Claims 2, 3, and 5 could not be anticipated by Jeong. Further, as explained above, Claims 2, 3, and 5 are further distinguished from Jeong. Claims 2, 3, and 5 could not be anticipated by Jeong. It is respectfully submitted that the rejections should be withdrawn.

Rejection of Claims 11-14 and 16-17 Under 35 U.S.C. § 102

Claims 11-14 and 16-17 have been rejected under 35 U.S.C. § 102(b) as being anticipated by Lee (US 5,774,630).

Claim 11

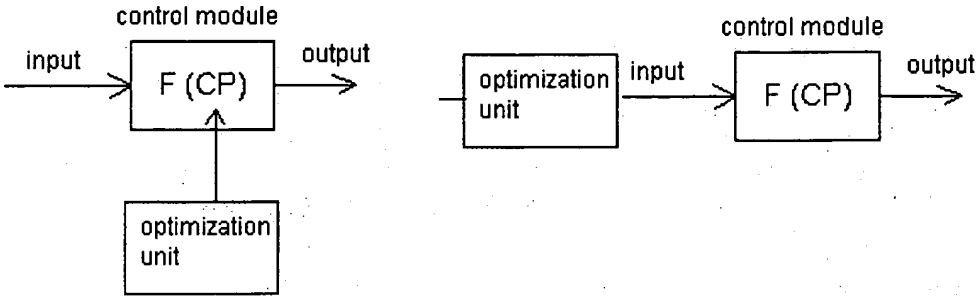
Claim 11 has been amended to recite the control module, the autonomous evolutionary process unit, and the interactive evolutionary process unit (e.g., Figures 2, 4, and 5). According to the above structure, it is possible to optimize the control module by using the autonomous evolutionary process unit and the interactive evolutionary process unit, thereby effectively optimizing the devices adaptively to the user.

In contrast, Lee's fuzzy logic controller 14 does not teach or even suggest a combination of the autonomous evolutionary process unit and the interactive evolutionary process unit (Figure 4B). Thus, Claim 11 could not be anticipated by Lee.

Claim 12

Claim 12 has been amended to further recite a basic control module in addition to the auxiliary control module arranged in parallel to or in a series with the basic control module (Figures 1b and 1c). In Lee, the Examiner thinks that the phase controller 18 is an auxiliary control module and the motor driving means 16 is a basic control module (because the auxiliary control module is subjected to optimization). However, as recited in Claim 11, the auxiliary control module is

regulated by control parameters, and the optimization process is applied to select the control parameters. In contrast, in Lee, a "control signal" (not control parameters) itself is outputted to the phase controller 18. Applying the optimization process to select control parameters (CP) is very different from applying the optimization process to output a control signal. See below.



Thus, Claim 12 could not be anticipated by Lee.

Claim 13

Claim 13 has been canceled without prejudice.

Claims 14, 16, and 17

These claims are dependent on Claim 11. As discussed above, Claim 11 could not be anticipated by Lee, and for the reason, these claims also could not be anticipated by Lee.

In conclusion, it is respectfully submitted that the rejection should be withdrawn.

Rejection of Claim 4 Under 35 U.S.C. § 103

Claim 4 has been rejected under 35 U.S.C. § 103(a) as being unpatentable over Jeong in view of Kamihira (EP 0957416A1).

The Examiner asserts that Kamihira discloses a method similar to that of Claim 2, wherein the main control module and the auxiliary control module are arranged in a line (col. 15, lines 32-37. However, contrary to the Examiner's assertion, Kamihira does not disclose the parallel arrangement, but discloses the series arrangement. Claim 4 recites the parallel arrangement (e.g., Figure 1c), and as recited in Claim 2, the auxiliary control module, not the main control module, is subjected to optimization. In Kamihira's the series arrangement, both two control modules are subject to optimization. Kamihira does not teach or even suggest the parallel arrangement, and

thus, Claim 4 could not be obvious over Jeong in view of Kamihira. It is respectfully submitted that the rejection should be withdrawn.

Rejection of Claims 6-8 Under 35 U.S.C. § 103

Claims 6-8 have been rejected under 35 U.S.C. § 103(a) as being unpatentable over Jeong in view of Bonissone (US 5,995,737).

The Examiner asserts that Bonissone discloses a method similar to Claim 1. However, as discussed earlier, Claim 1 as amended herein recites that the control module is optimized using a combination of interactive evaluation and autonomous evaluation used separately. Jeong is irrelevant to the above feature. Bonissone's system is not a real-time system but a simulation system. Further, Bonissone uses the velocity profiler 12 which is autonomous evaluation, but Bonissone does not teach or even suggest interactive evaluation. Thus, Claim 1 could not be obvious over Jeong and Bonissone. Claims 6-8 are dependent on Claim 1, and at least for the reason, it is respectfully submitted that the rejection should be withdrawn.

Rejection of Claims 9 and 10 Under 35 U.S.C. § 103

Claims 9 and 10 have been rejected under 35 U.S.C. § 103(a) as being unpatentable over Jeong in view of Kamihira.

However, as discussed earlier, Claim 1 as amended herein recites that the control module is optimized using a combination of interactive evaluation and autonomous evaluation used separately. Jeong is irrelevant to the above feature. Kamihira is also irrelevant to the above feature. Thus, Claim 1 could not be obvious over Jeong and Kamihira. Claims 9 and 10 are dependent ultimately on Claim 1, and at least for the reason, it is respectfully submitted that the rejection should be withdrawn.

Rejection of Claim 15 Under 35 U.S.C. § 103

Claim 15 has been rejected under 35 U.S.C. § 103(a) as being unpatentable over Lee in view of Kamihira.

Kamihira discloses an evaluation based on a user's intention. However, Kamihira does not teach or even suggest the optimization process device recited in Claim 11 comprising (i) a

control module regulated by control parameters which are selected separately by using (ii) an autonomous evolutionary process unit and (iii) an interactive evolutionary process unit, thereby effectively optimizing the control module. Lee is irrelevant to the above feature. Thus, Claim 11 could not be obvious over Lee and Kamihira. Claim 15 is dependent on Claim 11, and at least for the reason, it is respectfully submitted that the rejection should be withdrawn.

Rejection of Claims 18-25 Under 35 U.S.C. § 103

Claims 18-25 have been rejected under 35 U.S.C. § 103(a) as being unpatentable over Lee in view of Kamihira.

As discussed above, Claim 11 could not be obvious over Lee and Kamihira. Claims 18-25 are dependent on Claim 11, and at least for the reason, it is respectfully submitted that the rejection should be withdrawn.

New Claims

Claims 26 and 27 have been added. Claim 26 recites switching between interactive evaluation and autonomous evaluation based on time or the user's choice. This feature is not taught or suggested by any of the references. Claim 27 recites evaluating the extracted section extracted and/or the membership functions by the preselected target value. This feature is not taught or suggested by any of the references. Further, these claims are dependent ultimately on Claim 1 which could not be anticipated by or obvious over the references, and at least for this reason, it is respectfully submitted that these claims should be allowable.

CONCLUSION

In light of the Applicant's amendments to the claims and the foregoing Remarks, it is respectfully submitted that the present application is in condition for allowance. Should the Examiner have any remaining concerns which might prevent the prompt allowance of the application, the Examiner is respectfully invited to contact the undersigned at the telephone number appearing below.

Please charge any additional fees, including any fees for additional extension of time, or credit overpayment to Deposit Account No. 11-1410.

Respectfully submitted,

KNOBBE, MARTENS, OLSON & BEAR, LLP

Dated: September 23, 2003 By: _____

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Annotated sheet showing Changes

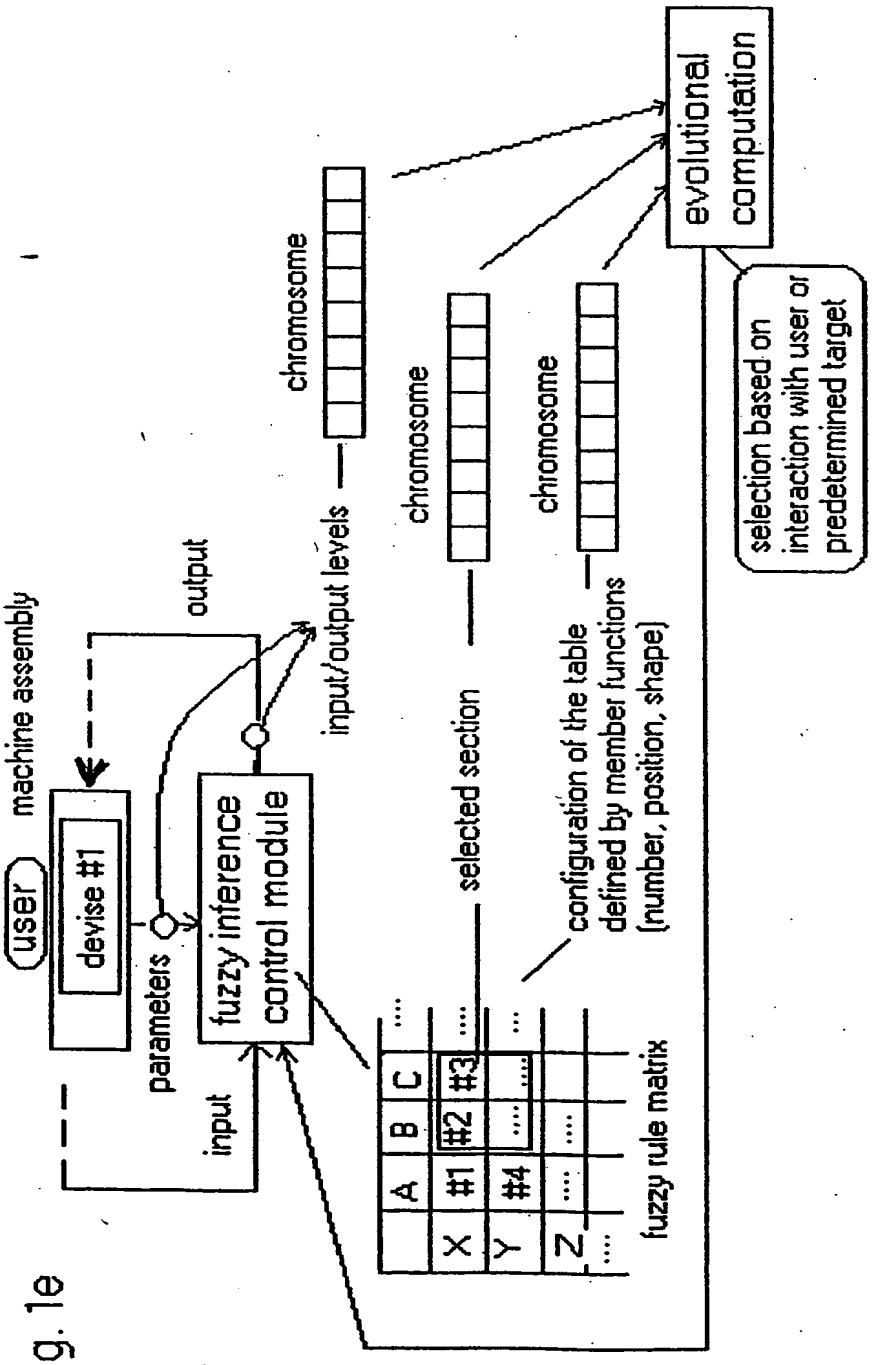


Fig. 1e

Annotated Sheet Showing Changes

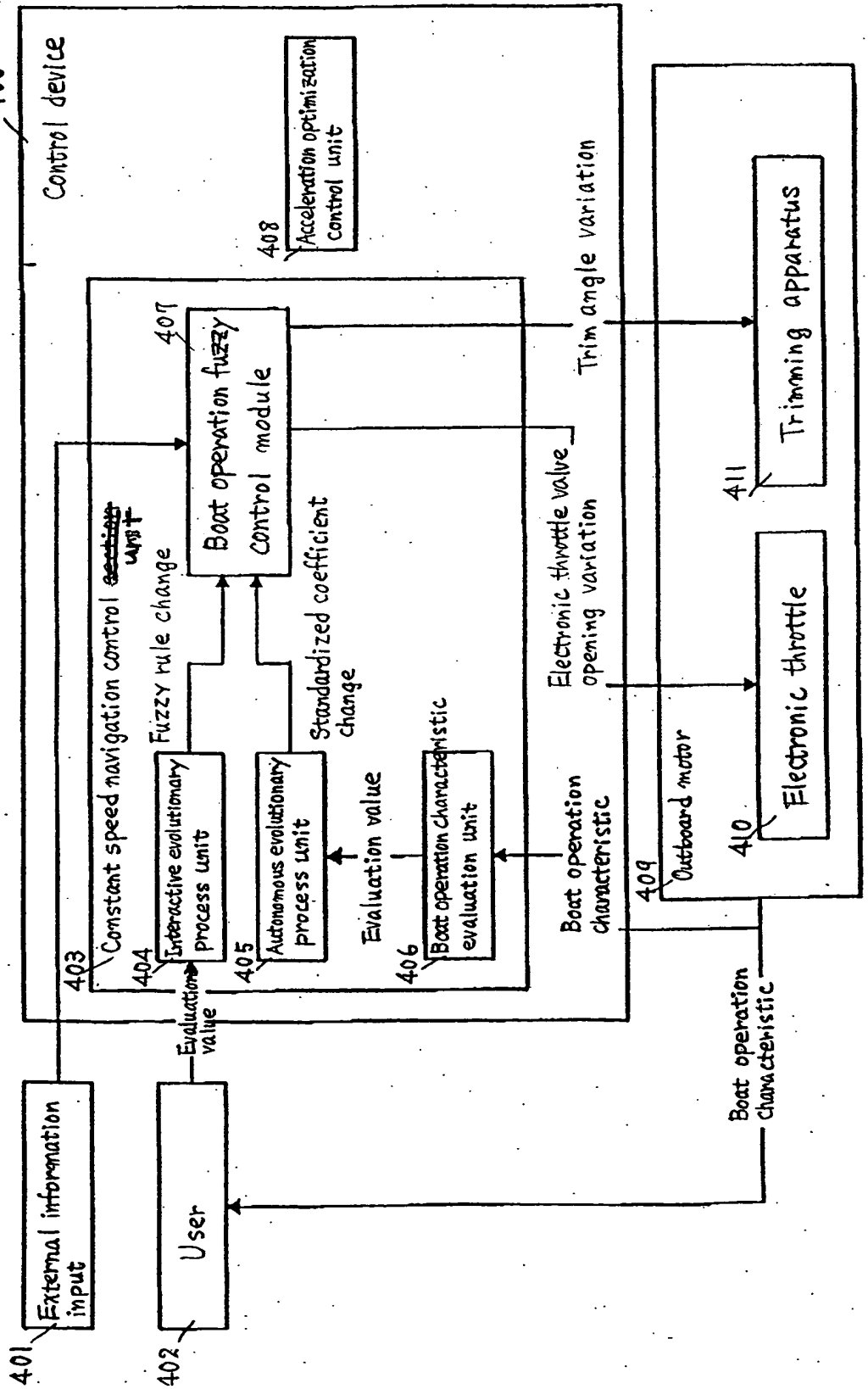


FIG. 4

Annotated sheet showing changes

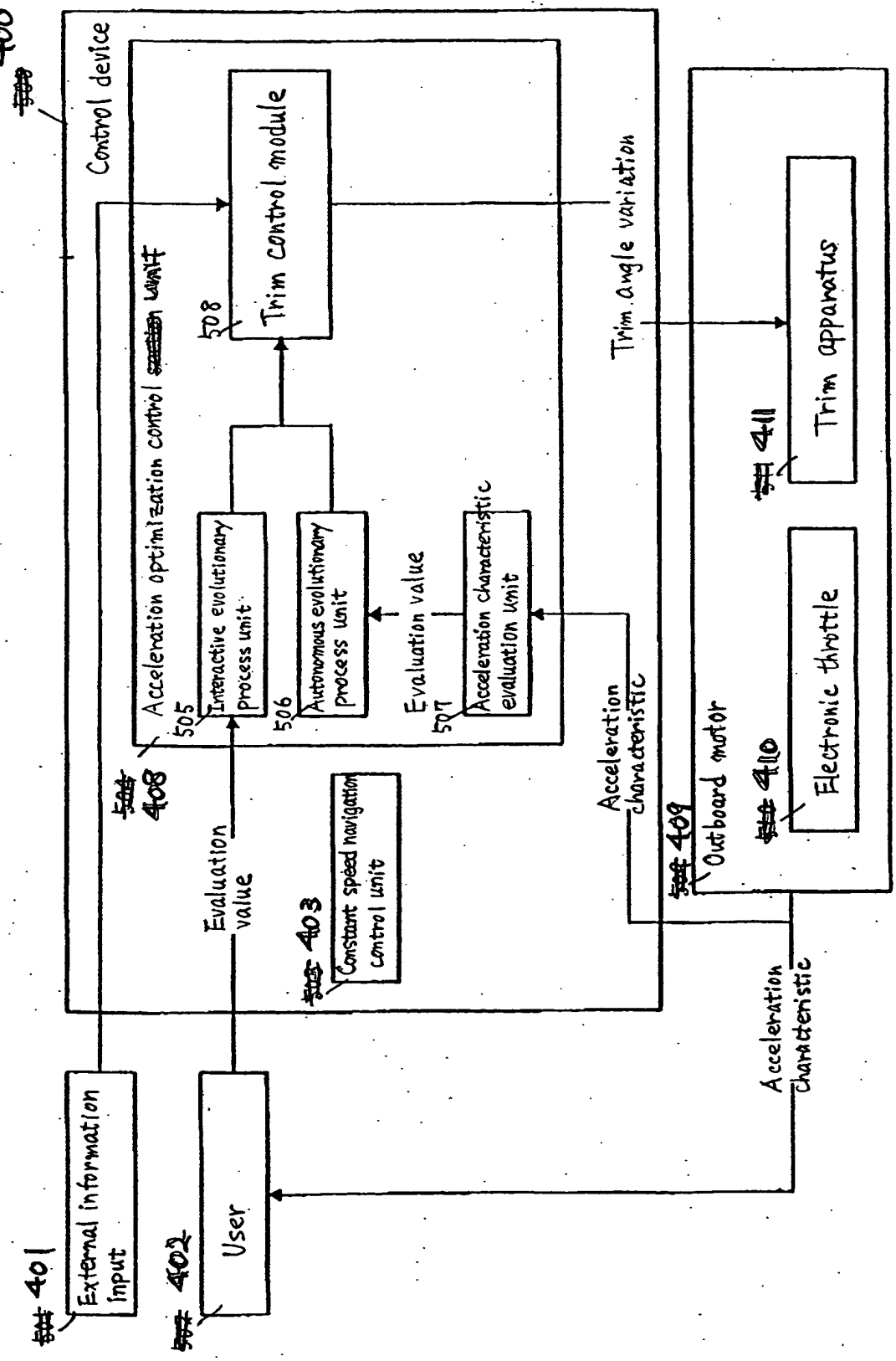
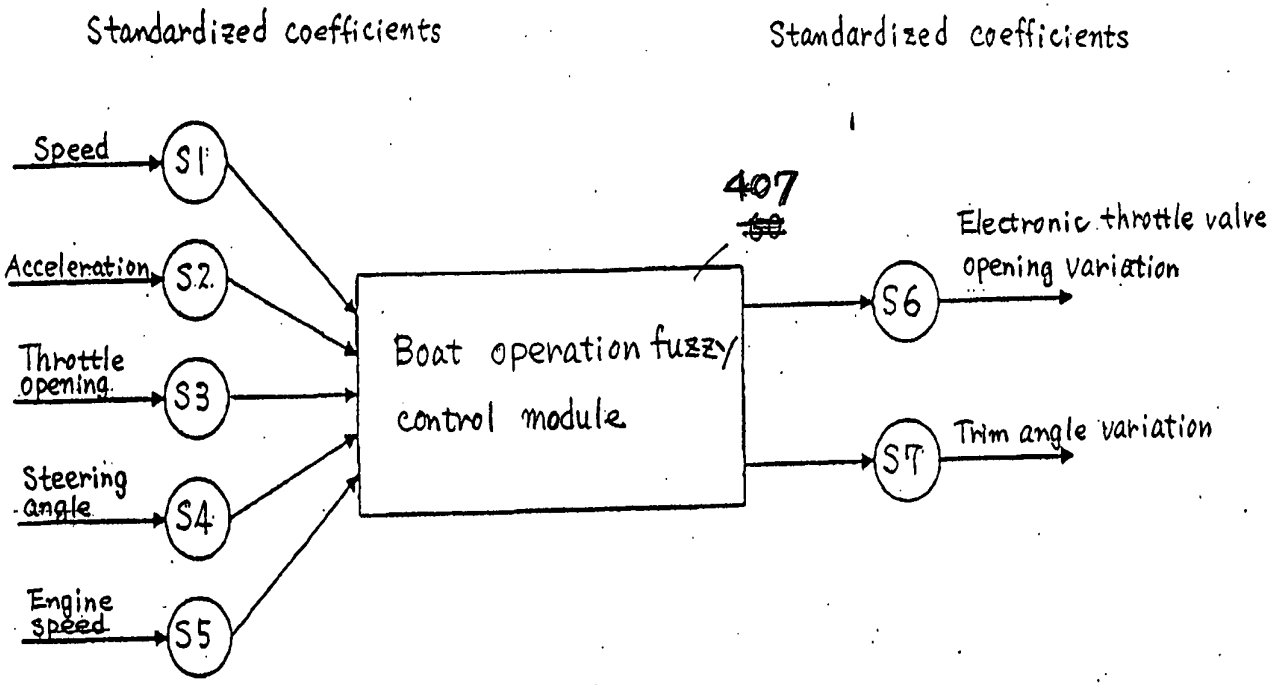


FIG. 5



S1	S2	S3	S4	S5	S6	S7

FIG. 6

Annotated sheet showing changes

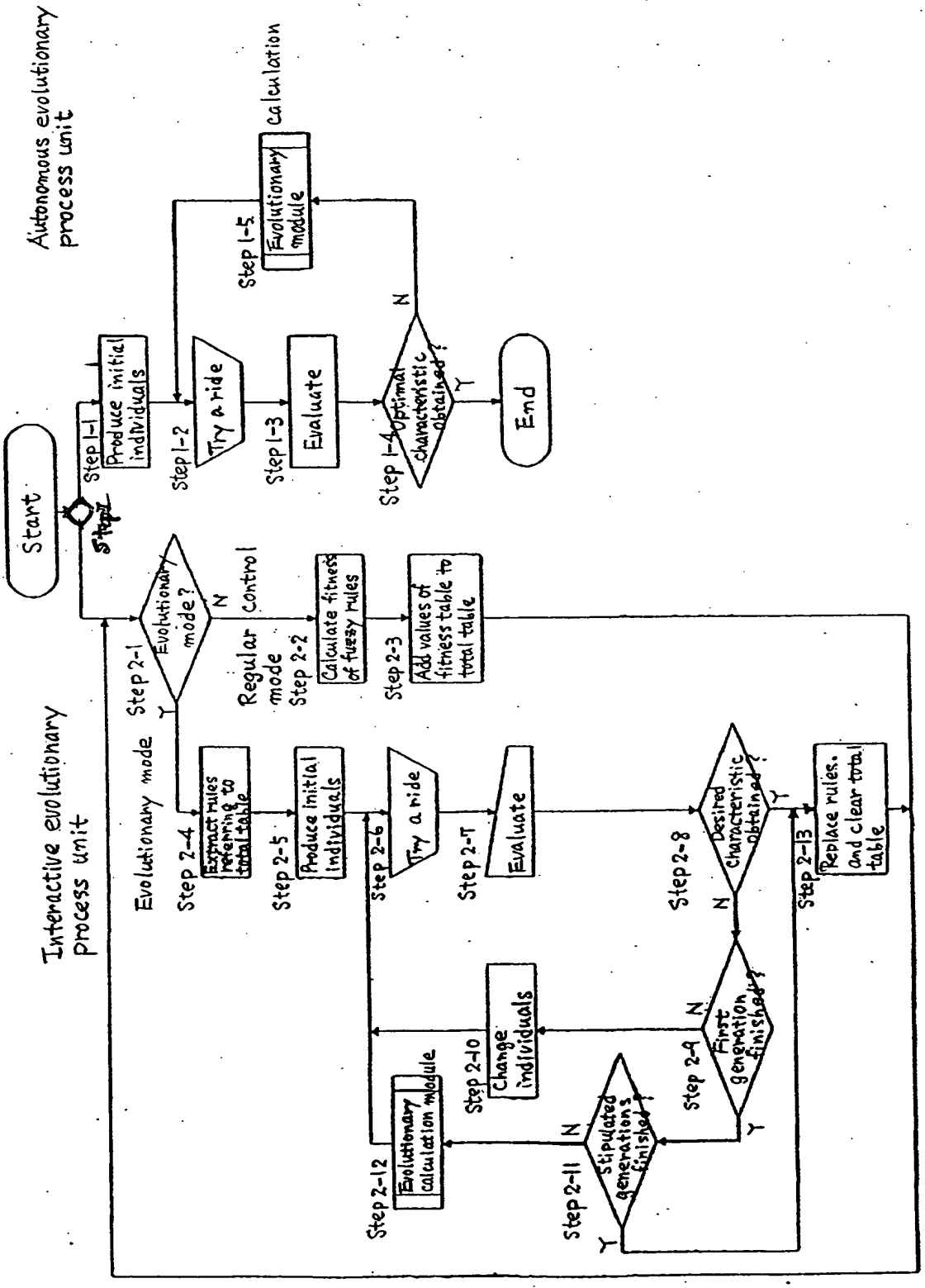


FIG. 8

Annotated sheet showing changes

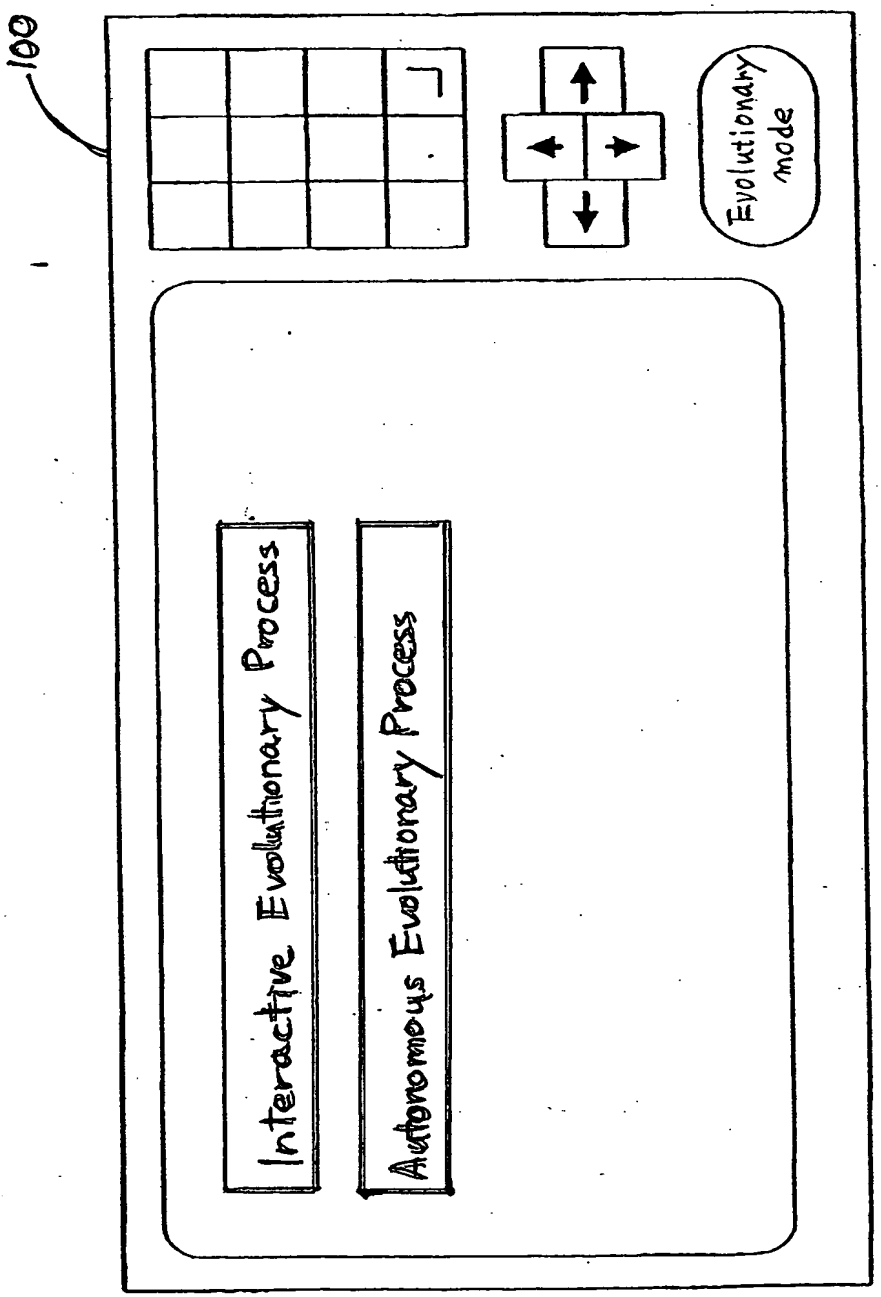


FIG. 10

Annotated sheet showing changes

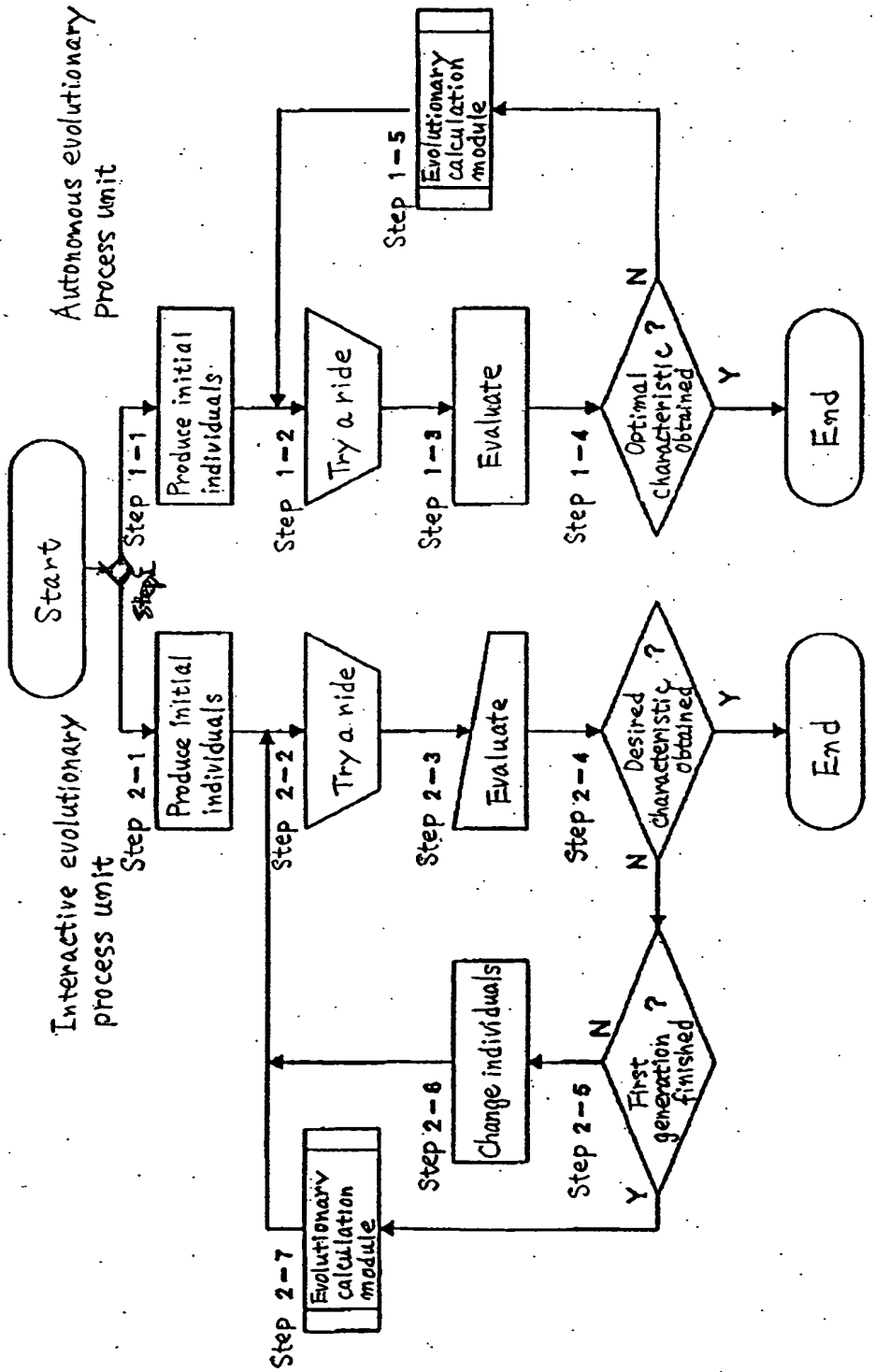


FIG. 14